Pilot hole stimulation thresholds accurately predict screw stimulation thresholds for cervical lateral mass screws

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Introduction

Electromyographic recording during stimulation of cervical, thoracic, and lumbar screws has become common practice over the past decade. Its function is determining which screws may be close to nerve roots or spinal cord. Activity seen at lower thresholds indicates screws are in close proximity to neurologic tissue. There fails to be an accepted threshold for when lateral mass screws should be repositioned/removed in order to prevent postoperative injury to the patient. There is little data regarding the significance of screws at various potentials. Screws with low thresholds may cause no signs and/or symptoms in the post-operative period. Further research is necessary to define significance of thresholds obtained during intraoperative monitoring. Clinical outcome should drive the definition of a "safe" threshold for which screws may be left in place.

Methods

The demographics, levels fused/instrumented, clinical outcome, postoperative radiographic data (if present), length of follow up, and stimulation thresholds of each screw and pilot hole recorded intra-operatively were collected in prospective fashion.

Results

Average pilot hole stimulation thresholds at C3, C4, C5, C6, C7 levels were 15.9, 13.5, 12.8, 12.8, and 13.0 respectively. Average lateral mass screw stimulation thresholds at C3, C4, C5, C6, and C7 were 16.8, 14.4, 14.4, 14.3, and 15.0 respectively. No patients had evidence of nerve root injury on post operative follow up.

Conclusions

Stimulation of pilot holes prior to screw placement provides reliable estimation of final screw stimulation thresholds. Our data indicates that screws typically stimulate at higher thresholds than the pilot hole. Additionally, pilot holes stimulating greater than 7 mAmp do not appear to result in nerve root injury post operatively.

Learning Objectives

Stimulation of lateral mass pilot holes prior to screw placement may help prevent poor screw placement.

Pilot Hole vs. Screw Stimulation Thresholds by Level

Lateral X-ray C3 to T1 Fusion

AP X-ray C3 to T1 Fusion

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